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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.              | CONFIRMATION NO.       |
|---|-------------|----------------------|----------------------------------|------------------------|
| 10/707,996  | 01/30/2004  | Daniel C. Edelstein  | FIS920030232US1                  | 1995                   |
| 7590 01/09/2008<br>Andrew M. Calderon<br>Greenblum and Bernstein P.L.C.<br>1950 Roland Clarke Place<br>Reston, VA 20191 |             |                      | EXAMINER<br>SCHILLINGER, LAURA M |                        |
|   |             |                      | ART UNIT<br>2813                 | PAPER NUMBER           |
|   |             |                      | MAIL DATE<br>01/09/2008          | DELIVERY MODE<br>PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/707,996

**Applicant(s)**

EDELSTEIN ET AL.

**Examiner**

Laura M. Schillinger

**Art Unit**

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) 7-48 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-6 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Allowable Subject Matter***

Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Holmes fails to teach nor suggest the limitations of claim 2, wherein the sub lithographic features further include a plurality of holes formed in a capping layer beneath the sub lithographic template mask and having a diameter or cross section less than a diameter or cross section of the at least one interconnect and also substantially equal to the substantially vertical columns in the insulator layer .

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4, 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Holmes et al  
(‘813)

Holmes teaches the following claimed limitations as cited below:

1. (original) A method of manufacturing a structure, comprising the steps of:  
providing a structure having an insulator layer (Fig.4 (8/5/2a) with at least one interconnect (Fig.4 (7));  
forming a sub lithographic template mask over the insulator layer (Fig.4 (9)); and  
selectively etching the insulator layer (8) through the sub lithographic template mask (9) to form sub lithographic features spanning to a sidewall of the at least one interconnect (7) (Fig.5).

The phrase spanning to a sidewall is interpreted by the Examiner in accordance with the definition found in Merriam-Webster's Collegiate Dictionary (10th Edition) (2001), which defines span as "an extent stretch or reach". The sublithographic pattern of layer 8 reaches the sidewall of layer 7 and therefore anticipates Applicant's claim.

2. (original) The method of claim 1, wherein the sub lithographic features are substantially vertical columns in the insulator layer (Fig.5).

4. (original) The method of claim 1, wherein the etching step is an anisotropic etching forming a plurality of the sub lithographic features defined as nano columns (Col.5, lines: 1-5).

6. (original) The method of claim 1, wherein: the sub lithographic features are substantially vertical columns in the insulator layer; the sub lithographic features further include a plurality of

holes having a diameter less than a diameter of the at least one interconnect and substantially equal to the substantially vertical columns in the insulator layer and a top portion of the holes are tapered (Fig.10- the examiner considers the hexagonal structure to be a form of tapering).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes et al ('813).

5. (original) The method of claim 4, wherein the etching step includes an isotropic etching to meld at least adjacent nano columns together and provide an undercut below the at least one interconnect- Applicant admits in the specification that of ordinary skill in the art would understand how to continue etching to form an undercut region from the trenched regions forming by sublithographic etching.

***Response to Arguments***

Applicant's arguments filed 8/20/07 have been fully considered but they are not persuasive. Applicant once again argues that the oxide layer is the basis for the Examiner's rejection in Applicant's Appeal Brief. This rejection should make absolutely clear that the oxide layer is not the insulating layer referred to by the Examiner and should further clarify the basis of

the Examiner's rejection. Applicant argues that silicon nitride is not taught as an insulating layer- Applicant points out that the Examiner has not provided evidence of record to show that silicon nitride is an insulating layer. The fact that silicon nitride is an insulator is well known in the art of semiconductors and is one of the most popular insulators used in semiconductor fabrication. Applicant is referred to Hawley's Condensed Chemical Dictionary (12<sup>th</sup> Edition) Richard J. Lewis, Sr. (1993) which defines silicon nitride as follows: "insulator and passivating agent in transistors and other solid state devices." The insulative nature of silicon nitride is an inherent property of the material.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M. Schillinger whose telephone number is (571) 272-1697. The examiner can normally be reached on M-T, R-F 7:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Laura M Schillinger  
Primary Examiner  
Art Unit 2813

01/04/08